

AMENDMENTS TO THE CLAIMS

1. (Currently amended) ~~[[Magnetic]]~~ A magnetic calibration device comprising:
 - a ~~mounting means~~ mount designed to support at least one magnetic sensor card being detachably attached and comprising at least one magnetic sensor, in particular in form of a Hall sensor, to be calibrated and connected to a first analog electronic circuit with at least one current source as well as at least one first analog to digital converter, and at least one coil card being detachably attached and comprising three coils arranged substantially orthogonal to each other and connected to a second analog electronic circuit with at least one second analog to digital converter;
 - at least one connection ~~means, in particular~~ in form of a cable or a wireless link~~[[.]]~~ for applying at least one supply voltage V_s to the first and second analog electronic circuits, respectively, and for guiding digital signals from the first and second analog to digital converters, respectively, to at least one processing unit;
 - a magnet for generating a substantially homogeneous and constant calibration magnetic field; and
 - a rotor for rotating said cards in said calibration magnetic field around two substantially orthogonal axes.
2. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the rotor comprises two conical gears, such as tooth gears or roll gears, two substantially concentrically arranged shafts and at least one driving unit for the shafts, in particular in form of a stepper engine controller connected to two engines and/or connected to the shafts via worm wheels.
3. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 2, ~~characterized in that~~ wherein the at least one driving unit is arranged outside the calibration magnetic field.

4. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 2, ~~characterized in that~~ wherein the speed and direction of rotation of the two shafts is controlled by the at least one driving unit to cover the full range of polar and azimuthal angles of the unit sphere by a continuous movement, ~~preferably including a time reversed rotation for compensating induction effects in the at least one magnetic sensor.~~

5. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 2, ~~characterized in that~~ wherein the magnetic calibration device is at least partly formed by vibration damping and nonconducting material, preferably and wherein at least one of the shafts comprises heavy, nonconducting material and/or is arranged in slide bearings.

6. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 2, ~~characterized in that~~ wherein the amount of turns of the inner shaft differs from the amount of turns of the outer shaft by one turn within one calibration cycle, the cable being preferably turned only once within one calibration cycle.

7. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the at least one processing unit is arranged outside the calibration magnetic field and stationary.

8. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein several magnetic sensor cards and/or at least one magnetic sensor card and the coil card are stackable next to each other, ~~preferably~~ closely spaced apart.

9. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized by~~ further comprising at least one dowel pin, screw, plug, clamp and/or clip to precisely and reproducibly position at least one magnetic sensor card and/or coil card.

10. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein one magnetic sensor card carries one 3-dimensional or one 2-dimensional and one 1-dimensional or three 1-dimensional Hall sensor(s).

11. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the first analog electronic circuit comprises at least one low pass filter, multiplexer and/or delta-sigma modulator.

12. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the second analog electronic circuit comprises at least one low pass filter, multiplexer and/or delta-sigma modulator.

13. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim ~~[[1]]~~ 11, ~~characterized in that~~ wherein the first ~~and/or second~~ electronic circuit, in particular the at least one low pass filter, is arranged in the region of the center of rotation of the cards.

14. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the processing unit comprises:

means for integrating the digital coil signals to obtain the components of the calibration magnetic field in angular coordinates relative to the coils;

means for decomposing the digital magnetic sensor output voltages into spherical harmonics on the basis of the obtained angular coordinates; and

means for storing the obtained coefficients of the spherical harmonics as a function of the calibration magnetic field to obtain a calibration table.

15. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized by further comprising~~ at least one magnetometer, in particular ~~[[in]]~~ at least one NMR magnetometer and/or fixed Hall sensor, arranged within the calibration magnetic field and connected to the processing unit to provide the absolute value of the calibration magnetic field to the processing unit.

16. (Currently amended) [[Magnetic]] The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the processing unit comprises:

means for performing a transformation of the obtained angular coordinates for aligning the reference frame with the symmetry axes of the at least one magnetic sensor.

17. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 1, ~~characterized by further comprising~~ at least one temperature sensing element, comprised by a thermistor or the Hall sensor and connected to the processing unit in order to supply the temperature within the calibration magnetic field, in particular of the Hall sensor, to the processing unit.

18. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 17, ~~characterized in that wherein~~ the processing unit comprises:

means for obtaining the temperature of the Hall sensor by decomposing the Hall input voltages depending on the magnitude and direction of the calibration magnetic field and the temperature into spherical harmonics on the basis of the decomposition of the Hall output voltages.

19. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 1, ~~characterized by further comprising~~ a thermal insulating box housing the ~~mounting means mount~~ with the magnetic sensor and coil cards, wherein said thermal insulating box ~~preferably is~~ connected to a control circuit for controlling the temperature within the box measured in particular by a temperature sensing element.

20. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 19, ~~characterized in that wherein~~ the control circuit, ~~preferably~~ comprised by the processing unit, comprises a Peltier element for cooling and/or heating, at least one ventilator~~[[, preferably]]~~ driven by an engine outside the calibration magnetic field, and a controller.

21. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 1, ~~characterized in that wherein~~ the current source of the Hall sensor is either a constant current source or a precise voltage source with an internal resistance substantially equal to the input resistance of the Hall sensor.

22. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein at least two magnetic sensor cards are supported by the ~~mounting means~~ mount, one card carrying at least one calibrated Hall sensor and each remaining card carrying at least one Hall sensor to be calibrated by comparison with the at least one calibrated Hall sensor.

23. (Currently amended) ~~[[Magnetic]]~~ The magnetic calibration device according to claim 1, ~~characterized in that~~ wherein the processing unit is comprised by a microprocessor and/or personal computer.

24. (New) The magnetic calibration device according to claim 4, further including a time reversed rotation for compensating induction effects in the at least one magnetic sensor.

25. (New) The magnetic calibration device according to claim 12, wherein the second electronic circuit, in particular the at least one low pass filter, is arranged in the region of the center of rotation of the cards.